

secondary battery having a long cycle life, a fast charging ability and a high service or discharge capacity.

### **Brief Description of the Drawings**

5        The present invention will hereunder be described in more detail with reference to the accompanying drawings, wherein

Fig. 1 is a cross sectional view schematically showing the structure of a typical cold cathode ray source of the conventional technique;

10       Fig. 2 is a cross sectional view schematically showing one of the structures of the graphite nanofibers according to the present invention;

Fig. 3 is a cross sectional view schematically showing another structure of the graphite nanofibers according to the present invention;

Fig. 4 is a cross sectional view schematically showing still another structure of the graphite nanofibers according to the present invention;

15       Fig. 5 is a schematic diagram for explaining the electron emission through the graphite nanofiber according to the present invention;

Fig. 6 is a side cross sectional view of a lithium ion secondary battery provided with the graphite nanofibers according to the present invention as a negative electrode active material;

20       Fig. 7 is a transmission electron micrograph (TEM) of the graphite nanofiber according to the present invention; and

Fig. 8 (A) is a plan view of a substrate with gate electrodes formed thereon and Fig. 8 (B) is a cross sectional view of the substrate shown in Fig. 8 (A), cut by a line a-a'.

25

### **Description of the Preferred Embodiments**

The graphite nanofiber of the present invention has a cylindrical structure in which graphene sheets each having an ice-cream cone-like shape whose tip is cut